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$$s = \left(v - F\right)\frac{\pi}{D},$$

$$\theta = \left(\omega - F\frac{r}{k^2}\right)\frac{\pi}{D}.$$

If (6) reduces to zero when $Dt = \pi$, the body would be at rest at the moment the string regains its original length and $F = \frac{1}{2}v$, but it would still have an angular velocity of $\omega + (rv \div k^2)$ as shown by (8). Similarly, if the rotary motion is destroyed at that instant, the linear velocity will be $v + (k^2\omega \div r)$, and will continue uniform. It may be shown that the kinetic energy of the moving body at the end of the variable motion is the same as at the beginning.

I have not attempted to solve the general case represented by equation (1). It is evidently very intricate.

NOTE ON PROF. CASEY'S TREATMENT OF PROB. 361, BY PROF. E. W. HYDE. — Referring to Prof. Casey's figure on page 194, Vol. VIII, the curves *nxm* and *pyw* are *not* semi-ellipses. They are tortuous curves whose projections on the plane *ABC* are arcs of an *hyperbola*, those on a plane perpendicular to *BM* equal curves, forming together a curve of the 4th order, and those on a plane perpendicular to these two planes, the circle which is the right section of the cylinder.

The differential expression for the volume is easily written but can be integrated only by expansion into series. Thus the equation of the cone is $x^2 + y^2 = (R^2 \div a^2)(z - a)^2$, and that of the cylinder, $y^2 + z^2 = r^2$; whence

$$V = 8R\int_0^r\int_0^{\sqrt{(r^2-z^2)}} dz\,dy \sqrt{\left[\left(\frac{z-a}{a}\right)^2 - \left(\frac{y}{R}\right)^2\right]} = 4R\int_0^r dz\left\{\sqrt{(r^2-z^2)}\times\right.$$
$$\left.\sqrt{\left[\left(\frac{z-a}{a}\right)^2 - \frac{r^2-z^2}{R^2}\right]} + \left(\frac{z-r}{a}\right)^2 R\sin^{-1}\frac{a}{R}\frac{(r^2-z^2)^{\frac{1}{2}}}{z-a}\right\}$$

[Mr. Eastwood puts for the equation of the cone and cylinder, respectively, $y^2 + x^2 = z^2\tan^2\beta$, and $(z-c)^2 + x^2 = r^2$, and gets

$$V = 4\int\sqrt{(r^2-x^2)}\left\{[\sqrt{(r^2-x^2)} + c]^2\tan^2\beta - x^2\right\}^{\frac{1}{2}}dx.$$

Mr. Heaton puts $x =$ the distance of a horizontal plane through the cylinder from the axis of the cylinder, and finds, for the area of such plane,

$$A = 2\sqrt{\left\{(r^2-x^2)[(R^2 \div a^2)(b+x)^2 - r^2 + x^2]\right\}} + 2(R^2 \div a^2)(b+x)^2\times$$
$$\sin^{-1}\sqrt{\left\{(r^2-x^2) \div [(R^2 \div a^2)(b+x)^2]\right\}};\text{ and therefore}$$

$$V = 2\int_{-r}^{+r}\left\{\left[(r^2-x^2)\left(\frac{R^2}{a^2}(b+x)^2 - r^2 + x^2\right)\right]^{\frac{1}{2}} + \frac{R^2}{a^2}(b+x)^2\times\right.$$
$$\left.\sin^{-1}\left(\frac{a\sqrt{(r^2-x^2)}}{R(b+x)}\right)\right\}dx.$$